

Profile of Dental Caries in Eastern and Western Parakanã Children at Amazônia Paraense, Brazil

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ABSTRACT

Objective: To evaluate the prevalence of dental caries in children from 18 months to 5 years of age in eastern (near urban centers) and western (far from urban centers) Parakanã, verify the influence of proximity to non-indigenous cultures, and compare with other ethnicities and non-indigenous. **Material and Methods:** The universe of children was examined by one researcher in a cross-sectional study. Descriptive analysis and the Mann-Whitney test ($p < 0.05$) were performed. **Results:** It was observed that 68.8% ($N = 53$) of children from 18 to 36 months of age presented $dmft = 0$ (without caries), while 12.5% ($N = 6$) of children of five years of age presented this condition. For children between 18 and 36 months, the average $dmft$ values were 0.74 ($SD = 1.91$) for eastern children and 1.25 ($SD = 1.65$) for western children. At five years of age, the average $dmft$ values were 4.35 ($SD = 3.29$) and 3.75 ($SD = 2.05$) for eastern and western, respectively. Mann-Whitney test ($p < 0.05$) showed no difference between East and Western children. When compared with non-indigenous Brazilian children, the values behaved similarly. **Conclusion:** Knowledge of the epidemiological profile of dental caries in Indigenous Parakanã children is relevant both in planning oral health actions for this population and for aggregating information, which is still scarce for Indigenous.

Keywords: Prevalence; Indigenous Peoples; Dental Caries; Child.

Introduction

The studies of dental caries prevalence in indigenous peoples, although more complex to carry out than in non-indigenous peoples, can contribute to the understanding of the still obscure health disease process of these individuals. It constitutes necessary references for the construction of effective policies in indigenous health. Many available studies are conducted in Anglo-colonizing democracies (Canada, Australia, New Zealand, and the United States), although a smaller portion of indigenous peoples are found in these countries [1]. The lack of consistent information creates an "invisibility," for example, of Latin American and Caribbean [2] indigenous people. It is a concerning situation since, in Latin America and the Caribbean, more than half of the children have the disease [3]. Therefore, further studies on its associated factors need to be carried out.

The findings on dental caries in indigenous people, most of them in adult populations, exhibit a higher prevalence of the disease when compared to non-indigenous people, even in the same region or area [4,5]. The proximity to non-indigenous people is indicated by some studies as harmful, for example, due to the incorporation of dietary patterns different from the usual [6,7] ones by not adopting preventive actions, among others [8,9]. In this way, maintaining tradition is listed as a protective factor for Indigenous people concerning tooth decay. In contrast, there are reports stating that the proximity of indigenous peoples to non-indigenous cultures is beneficial for better oral health conditions in indigenous peoples; these cases are due to the greater possibility of health care [10,11]. Thus, finding a coherent and unbiased understanding of the influence and convenience of non-indigenous sociocultural interferences is necessary. Although an in-depth anthropological intervention is required to understand this conflict adequately, some aspects can contribute to its elucidation. Comparison of health/disease conditions between different ethnic groups and between indigenous and non-indigenous peoples can indicate some answers. This type of investigation gains importance in times of migratory waves and proposals for changes in the demarcation of indigenous lands [12] when contact between indigenous and non-indigenous people tends to intensify. It is also to take into consideration the need for studies in populations as early as possible since the literature indicates that caries in primary dentition are a predictive factor for dental caries in the adult population. Attention should be paid to comparing ethnic groups, thus adding more elements.

Brazilian indigenous people are estimated at 817 thousand, which corresponds to 0.49% of the entire population of the country, more than half of indigenous people in Latin America and the Caribbean, and a representative indigenous population in the world, 36.2% lives in urban areas, and 63.8% lives in rural areas. Amazonians represent the largest population, with approximately 342 thousand individuals [13]. The analysis of caries disease encounters in this population is a privileged field of study.

The Parakanãs, deriving from Tupi Guarani, call themselves "Awaete" (real people) [14,15]. They live semi-isolated and are lately being exposed to risk factors for falling ill [11]. They live on the banks of the Tocantins River on their left, southeast of the State of Pará. Their lands are located in the municipalities of Itupiranga and Novo Repartimento. They are divided into two large population blocks: the Western Parakanã and the Eastern Parakanã. Awaete xe'enga is the Parakanã mother tongue and dialect of the Tupi trunk, Tupi Guarani family. These indigenous peoples have Portuguese as their second language [14]. The Parakanã population at the time of this study consisted of 1056 indigenous people, of which 372 (35.2%) belonged to the western Parakanã group and 684 (64.8%) to the eastern group. The groups live in family cores distributed in 15 villages, six villages from the western group and nine from the eastern group [14,15]. The western Parakanã are more distant from contact with non-indigenous culture as they live further away from urban centers and the Transamazon Highway, while the eastern Parakanã are closer. These two blocks originated from a split at the end of the 19th century. The Orientals were submitted to the administration of FUNAI in 1971 when the

Transamazon Highway was built; Westerners, on the other hand, were contacted between 1976 and 1984 at various times and in different locations [15]. As of 1989, the Parakanã Program (PROPK) took over health care for the Parakanã exclusively. An agreement signed between Eletronorte (Centrais Elétricas do Norte do Brasil S/A) and FUNAI (National Indigenous Foundation) originated the program. With this agreement, a policy of assistance to the Parakanã was implemented; it supported productive activities, culture valorization, health assistance, implementation of a school education system in the village, environment protection, and territorial defense [16]. The geography between Parakanã villages allows a comparison between health/disease conditions as well as verifying the possibility of the impact of proximity to other cultures. Furthermore, the Parakanã population contingent is expressive, which allows for more robust information analysis. In this way, its analysis can contribute to a better understanding of diseases in these indigenous people and possible relations with proximity to non-indigenous cultures.

The present study verified the prevalence of dental caries in eastern and western children of the Parakanã indigenous ethnicity, discussed possible impacts of proximity to non-indigenous culture, and compared the findings in the literature referring to three other indigenous ethnicities and non-indigenous populations in corresponding age groups.

Material and Methods

Population and Sampling

A universe of 131 children in the age groups was invited through their parents, and there was 100% adherence. Six of these children were randomly selected and participated in the calibration study conducted by a researcher, the two-week interval between the two approaches. The other 125 children had their exams included in the main cross-sectional survey. As eligibility criteria, children of the Parakanã ethnicity with the index ages recognized by the World Health Organization and the Ministry of Health of Brazil, from 8 to 36 months and five years of age, of both genders, were invited. Children were stratified according to their 15 villages of origin, eastern or western, so comparison between groups was viable. The location of east and western villages in relation to the large adjacent cities can be seen in Figure 1.

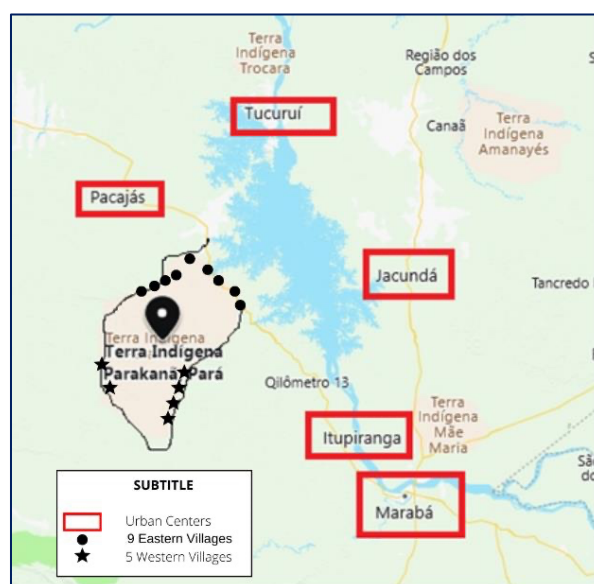


Figure 1. Relation of eastern and western Parakanã villages according to proximity to large urban centers in the state of Pará, Brazil.

Available studies on the prevalence of dental caries in other Brazilian indigenous ethnic groups for the same standardized age groups according to the World Health Organization (WHO) were searched in the Lilacs, Web of Science, and Pubmed databases using the following search method: cross-sectional studies including "Prevalence OR cross-sectional study" AND "Indigenous Peoples" AND "Dental Caries" AND "Child" terms, published in the last 20 years. We also searched for oral health surveys in non-indigenous Brazilian children (SBBrasil 2003 [17] and SB-Brasil 2010 [18]) so comparisons could also be made.

The Parakanã children who participated in the study were recruited through an active search in schools and their homes, which is the place of work of a researcher. The children were initially located through registration in the Parakanã Program [19] information system. Clinical examinations were performed under natural light by a single examiner, researcher, and dentist responsible for local care with flat mouth mirrors, WHO probes with rounded tips, disposable tongue depressors, and gauze. All instruments were sterilized according to biosafety standards [20].

Data Collection and Analysis

Dental caries data were recorded in a form designed for this purpose; the form of the Survey on Oral Health Conditions of the Brazilian Population [17,18] was used as a reference. The intraexaminer reliability showed conformity of 99% (Kappa 0.99). The data using the Statistical Package for the Social Sciences program (SPSS for Windows, version 22.0, SPSS Inc., Chicago, IL, USA) were analyzed using absolute and relative frequencies, average, and standard deviations. The Mann-Whitney test was used to compare the dmft and its components concerning the western and eastern Parakanã groups with a significance level of 5%.

Ethical Clearance

This study was carried out in compliance with the Declaration of Helsinki and was approved by Ethics Research Committee report n° Certificate of Presentation for Ethical Consideration: 45215415.3.0000.5149, and by the National Research Ethics Commission. The authors declare no conflicts of interest involving this study; the children's guardians signed an Informed Consent Form.

Results

The absolute number and the corresponding percentage of caries-free children (dmft = 0) for the age groups 18 to 36 months and five years old can be seen in Table 1. Between 18 and 36 months, the prevalence of dental caries in primary dentition is 31.2%. At five years of age, the prevalence is almost three times higher (87.5%).

Table 1. Caries prevalence obtained by dmft according to age in Parakanã indigenous children aged 18 to 36 months and five years old.

dmft	Age			
	18 to 36 months		5 Years-Old	
	N	%	N	%
dmft = 0	53	68.8	6	12.5
dmft ≥ 1	24	31.2	42	87.5
Total	77	100.0	48	100.0

Table 2, where the children were grouped into eastern and western, shows the averages of the dmft index components in the ranges from 18 to 36 months and five years old and the respective standard deviations.

There was no significant statistical difference in the dmft values and its decayed components with indicated extraction and filled among the two Parakanã groups ($p > 0.05$).

Table 2. Descriptive analysis of children of the Parakanã ethnic group according to age, villages of origin, and gender.

Age N/%	Village N/%	Gender N/%
18 a 36 Months (77/61.6)	Eastern (61/79.2)	Male (55/90.1)
		Female (6/9.9)
	Western (16/20.8)	Male (7/41.4)
		Female (9/58.6)
5 Years-Old (48/38.4)	Eastern (40/83.3)	Male (9/22.5)
		Female (31/77.5)
	Western (8/16.7)	Male (7/87.5)
		Female (1/12.5)

The average comparison of the indices found for eastern and western Parakanã children, along with three other Brazilian indigenous ethnicities and non-indigenous within corresponding years, is shown in Tables 3 and 4.

Table 3. Average of the dmft index components in the age group 18 to 36 months and five years old, Eastern Parakanã from Western Parakanã.

Age	N (%)	Decayed Average (SD)	Missing Average (SD)	Filled Average (SD)	dmft Average (SD)
18 to 36 Months – Parakanã Eastern	61 (79.2)	0.62 (1.82)	0	0.11 (0.55)	0.74 (1.91)
18 to 36 Months – Parakanã Western	16 (20.8)	1.13 (1.50)	0	0.13 (0.50)	1.25 (1.65)
p-value		0.095	1	0.988	0.139
5 Years-Old – Parakanã Eastern	40 (83.3)	2.98 (2.50)	0.60 (0.84)	0.73 (1.38)	4.35 (3.29)
5 Years-Old – Parakanã Western	8 (16.7)	3.00 (1.51)	0.57 (0.79)	0.29 (0.76)	3.75 (2.05)
p-value		0.734	1	0.568	0.860

SD = Standard Deviation; dmft = Decayed, Missing, and Filled Teeth; P-value = Mann-Whitney.

Table 4. Average comparison of the dmft index in the age groups 18 to 36 months and five years old among Eastern and Western Parakanã, the national average of declared indigenous individuals, the Potiguara, the Guarani, the Boniwa and the non-indigenous population.

Ethnic Group	Age		Year of Study
	18 to 36 Months dmft (Average)	5 Years-Old dmft (Average)	
Parakanã Eastern	0.74	4.35	2016
Parakanã Western	1.25	3.75	2016
Total Parakanã	0.99	4.50	2016
Ethnicity Potiguara ⁽¹⁾	2.53	5.87	2013
Ethnicity Guarani ⁽²⁾	0.6	2.6	2009
Ethnicity Baniwa ⁽³⁾	1.7	6.3	2008
Non-indigenous – North Region ⁽⁴⁾	1.34	3.22	2003
Non-indigenous – Brazil (National Average) ⁽⁴⁾	1.07	2.80	2003
Non-indigenous – North Region ⁽⁵⁾	*	3.81	2010
Non-indigenous – Brazil (National Average) ⁽⁵⁾	*	2.63	2010
Declared Indigenous – Brazil (National Average) ⁽⁵⁾			2010

¹⁾Sampaio et al. [20]; ²⁾Alves Filho et al. [19]; ³⁾Carneiro et al. [8]; ⁴⁾SB-Brasil [7]; ⁵⁾SB-Brasil [6]; Observation: *The age group from 18 to 36 months was not included in the epidemiological survey SB-Brasil 2010.

Discussion

Dental caries experienced between the analyzed groups differed but did not reach statistical significance. Dental caries showed different regional patterns; indigenous children showed greater susceptibility to the

disease, and all groups of five-year-old children analyzed had higher dmft values when compared to children aged 18 to 36 months.

An analysis of dental caries disease and the proximity of Parakanã children to non-indigenous population counters some studies in other ethnic groups and countries, which indicates that this contact is a negative impact factor on oral health. Indeed, the change in dietary patterns, especially the consumption of industrialized sugars, tends to magnify tooth decay rates in any population. However, it is necessary to consider that this contact is consistent with including habits that are harmful to indigenous health and with habits and conditions favorable to oral health, such as prevention actions and access to dental care. More studies are needed to elucidate the impacts of contact between indigenous and non-indigenous people, as this situation is growing and inevitable. These studies must take place impartially so that healthcare actions result in the least possible damage and combine indigenous and non-indigenous wisdom. In this context, it is necessary to emphasize that all forms of indigenous health care imply some degree of interference with people's habits.

The comparison between indigenous ethnic groups showed that Parakanã children sometimes presented better and occasionally worse indices considering the distance from urban centers but pointed to regional inequalities and worse indicators in children aged five years. The Parakanã had better rates for both age groups when compared to indigenous children of the Potiguara [21] and Baniwa [22] ethnic groups. Compared to Guarani [23], the indexes found in Parakanã were worse. The reflection on the proximity factor to urban areas and the impact on oral health conditions did not indicate any tendency here. The Baniwa live in an area of the State of Amazonas (Northern region of Brazil) on the border between Brazil, Colombia, and Venezuela; therefore, they are far from non-indigenous civilizations and have difficult access to health services [22]. The children of the Potiguara ethnic group in the State of Paraíba (Northeast region of Brazil) are closer to urban centers. Like the eastern Parakanã, the Guarani [23] live close to Rio de Janeiro's metropolitan areas and have better access to oral health services. It is observed among the three ethnic groups considered close to urban centers (Eastern Parakanã, Potiguara, and Guarani) that the Guarani presented better values than the first two. In this context, there is a call for reflection on the fact that the Guarani people are located in the southeast, which means a more prosperous region of the country; it may be consistent with the best rates in the populations studied. The proportion of dental caries in children aged five years from the four indigenous ethnic groups was higher when compared to children aged 18 to 36 months.

The comparison of dmft values between Parakanã and non-indigenous children also pointed to regional differences and higher rates in five-year-old children; it showed once again that indigenous people are more vulnerable to the disease. The surveys carried out in the SB Brasil Program, a policy that has expanded access to services provided to the Brazilian population, indicated regional differences in the rates of dental caries. However, the benefits of this policy did not extend to the entire population, the indigenous population [9,11] included, and this finding can be seen in this study. The epidemiological survey that occurred in 2003 comprehended the age groups 18 to 36 months and five years old; the 2010 survey only comprehended the five-year-olds group. Non-indigenous children aged 18 to 36 months in the Northern Region have a slightly higher prevalence of caries (dmft = 1.34) [17] than the Parakanã children in the two groups. The national average of non-indigenous children aged 18 to 36 months in 2003 is situated between the values found in eastern and western Parakanã children. However, at five years of age, the difference is accentuated, and in the case of the North region, one of the most significant socioeconomic inequalities, this situation is aggravated. On average, a five-year-old non-indigenous child in Brazil has dmft = 2.8 teeth affected by dental carie in the North Region (dmft = 3.81), while in western Parakanã (dmft = 3.75) and the eastern Parakanã (dmft = 4.35). This finding

corroborates Kramer et al. [24], who consider that access to oral health services for children up to five years is still challenging for public health. This condition is aggravated in indigenous children in villages [25]. Children from the North Region of Brazil, indigenous or non-indigenous, may have presented this greater vulnerability, for example, because they do not have access to fluoridated water in the villages and due to limited access to prevention actions (such as daily brushing with fluoridated toothpaste) [9,11]. Added to this, one can consider the language barrier in the case of indigenous people, which makes communication between children, parents or guardians, and health professionals arduous.

Incompatibility in communication makes it harder to encourage self-care in oral health. Once again, it reinforces the understanding that the approximation of indigenous and non-indigenous people needs to take place cautiously, as the attempt to bring technical knowledge and health care cannot contribute to the “death of the Parakanã culture” [6]. In this context, some fields of expertise, such as health literacy among indigenous [26,27] people, preferably in primary health care, can contribute to this inevitable mild contact and result in beneficial cultural exchange, reducing existing differences.

The study highlighted the need to develop standardized methodologies for epidemiological surveys with professional training and sustainable political-social agreements [28] that include indigenous populations with necessary adaptations for data collection. Thus, indigenous oral health conditions could be analyzed based on information with more significant scientific evidence [18,25].

Age criteria, such as the age groups established by the WHO and used in this study, could be considered so that age adjustments are not necessary and comparison between groups is possible. Studies that sought to establish comparisons in oral health between Brazilian, Australian, and New Zealander indigenous populations, for example, needed to make adjustments in age groups in order to do so based on the age standards recommended by the WHO and in force in Brazil [28].







The cross-sectional study design cannot offer evidence about the paradox pointed out. It is necessary to lift this limitation, but the reflections presented in this manuscript on the paradox aim to stimulate an essential and critical discussion on the theme since this is a gap in the literature. Although the study has a unique importance in planning dental care actions in the Parakanã Indigenous Land (PIL), future surveys are needed for a better longitudinal delineation of the disease in this population and comparisons with other ethnic groups and with non-indigenous people, especially in children [29,30]. Because Parakanã is under health care by a constant team, such monitoring is feasible. Then, the vital role of non-indigenous cultures is highlighted. If, on the one hand, it feeds the discourse that proximity could lead to the elimination of habits and customs, on the other hand, this same discourse brings the paradoxical situation that they need non-indigenous interventions so that their cultures can be self-preserved as recently reinforced by the United Nations [31]. Indigenous autonomy needs to be considered for health decision-making, but for that to happen, there is still a long way to go, anthropologically traced, to minimize negative cultural impacts. Any individual, whether indigenous or not, brings with them an interpretation of the world around them, of life and death, as well as of spiritual causes, disease, healing, and, certainly, a concept of their cultural health system [32-34]. In a global world, intercultural proximity is a reality with no return due to the proximity between indigenous and non-indigenous people.

The study has limitations, such as the inclusion of only three other indigenous ethnic groups for comparison. The lack of studies that assess populations with the same age groups standardized in children does not allow for extrapolation of the findings to other indigenous populations. Studies with an anthropological approach should be added to the findings to better understand the role of non-indigenous cultures in the establishment of oral health of the Parakanã.

Conclusion

Eastern and Western Parakanã children did not present dental caries indices different from each other. Still, their values are worse than the average for the North region and non-indigenous Brazilian children. Compared to caries indices in children of other Brazilian ethnicities in the same age groups as standardized by the WHO, the proximity factor to non-indigenous cultures presented as not a determinant of illness.

Authors' Contributions

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All authors declare that they contributed to a critical review of intellectual content and approval of the final version to be published.			

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Conflict of Interest

The authors declare no conflicts of interest.

Data Availability

The data used to support the findings of this study can be made available upon request to the corresponding author.

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